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$3 PER ANNUM IN ADVANCE.

Joseph A. Sabbaton's Adjustable Tar Valve.

The question of the dip-pipe seal has recently attracted the serious and increasing attention of Gas Engineers. The porosity of clay retorts, more than the high temperature at which they are habitually worked in American practice, serves to give an importance to every element of back-pressure which did not exist during the use of irons. And as an adjunct to the exhauster, any means by which the seal of the dip-pipe is rendered variable at will, commends itself forcibly to our attention.

In his management of the Manhattan Gas Company's works of this city, Mr. Sabbaton employs the tar valve, of which we herewith give a sectional illustration.

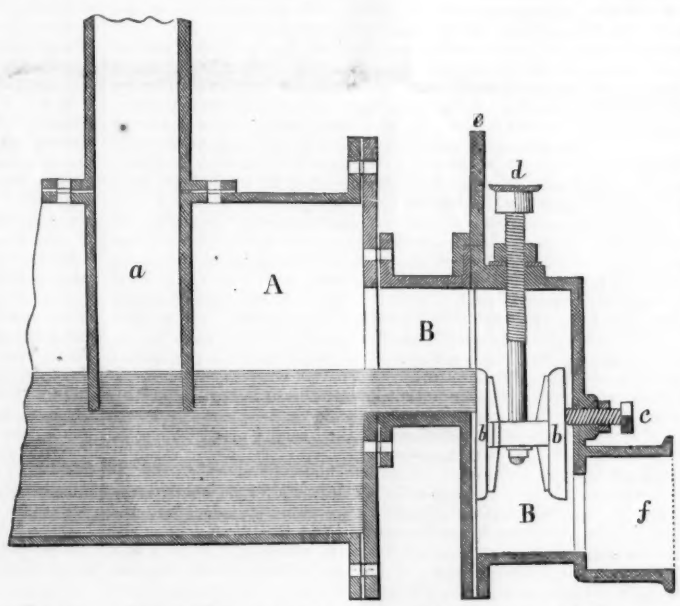
The valve is shown on a scale of an inch and a half to the foot, and of dimensions suitable for a four-inch tar overflow.

A represents the hydraulic main with its dip-pipe *a*. To its end flanch is bolted the valve, B B, the inlet of which corresponds with an aperture in the flanch.

The gate of the valve, *b b*, is shown as set to a seal of two inches. It works against a faced flanch, to which it is pressed firmly by the horizontal set screw, *c*, and is actuated vertically by a substantial adjusting screw, *d*, which travels close to a graduated scale, *e*, showing at a glance the amount of seal. As the tar accumulates in the main, it flows over the top of the gate, and so finds its way to the outlet socket, *f*, which receives the tar-pipe.

The advantage of this valve will be so obvious to every engineer, and its construction is so simple, as to render unnecessary any lengthy description of it.

The valve is manufactured and for sale by Messrs. Herring & Floyd, of the Oregon Iron Foundry, 740 Greenwich street, New York City.



JOS. A. SABBATON'S ADJUSTABLE TAR VALVE.

The Petroleum Trade of Pittsburg.

At the present time there are fifty-eight refineries in the city of Pittsburg and suburbs; of these fifty-one are in operation, and seven are idle. These refineries employ about 700 hands, whose yearly wages amount to $560,000. The refining capacity of these refineries is equal to 31,500 barrels a week. Nearly the entire amount of these sums invested have been distributed among the other branches of manufacturing in Pittsburg; having thus added to the business of the city in five years nearly thirteen million of dollars. There is also expended in repairs annually a sum which it is estimated amounts to ten per cent. upon the value of the investments in the refineries, barges, tanks, etc., or an annual expenditure of over one and a quarter millions per annum among the workshops of the city.

There are at present thirty-five oil brokers or oil commission houses, doing business in the city, which, with the fifty-eight firms running the refineries, makes nearly one hundred new business houses added to the city in the same space of time. The oil business has also brought into operation in the city cooperages turning out about 7,000 barrels per week, the value of whose work is nearly one million of dollars yearly.

The opening of the Alleghany Valley R. R. will, it is thought, have an invigorating effect on the amount of trade from the facility which it gives for a regular daily receipt of crude. The productions of the different oil regions are variously estimated. The best we can obtain give the following:

Venango Oil Region, about	1,800,000	per year.
Ohio Oil Region, about	360,000	"
West Virginia Oil Region, about	450,000	"
Smith's Ferry Oil Region, about	15,000	"
Green Oil Region, about	500	"

Or a total of 2,625,500 barrels yearly.

The estimates of the distribution of this, based upon the large amount of reliable statistics of exportation, and railroad shipment, are as follows:

Foreign consumption	1,600,000	barrels
Home consumption and Canada	500,000	"
Loss in refining	450,000	"
Loss by leakage	250,000	"

Or a total consumption of about 2,625,500 barrels.

The exportations to foreign ports, which are reliable in point of fact, show, that for the past two years the estimate given above of foreign consumption is nearly correct, if the exportation is evidence of demand. It must not, however, in connection with this be overlooked that present estimates give a stock on hand in Europe equal to 500,000 barrels. If this is so, and it may be assumed to be the accumulation of the past two years it would seem that the true estimate of foreign consumption is about 1,300,000 barrels, in which case the present production is nearly balanced by the present consumption.—*Pittsburg Chron.*

Steel from Pig Iron.

We learn, says the London *Mining Journal* of 14th December, that an important discovery is being matured by two Glasgow gentlemen (a brassfounder and a civil engineer), by which they have succeeded in obtaining steel of extraordinary hardness from pig iron. This adamantine metal, so far as we can make it public, is procured by placing ordinary pig iron in a crucible, and when brought into a state of thorough fusion certain chemicals are added, which seem to have the double effect of purifying and hardening the metal, when it is run into ordinary sand moulds. For the manufacture of files, turning tools, etc., it is expected to be of great value. We have had an opportunity of examining a turning instrument made of this singular metal, which has been used in the turning shop of the Messrs. Napier, Glasgow, and it left the lathe with as fine an edge as when it commenced. Another tool, tried in another shop, is reported to have been kept turning till it acquired a blue heat, without receiving the slightest injury. This metal requires no tempering, and when used for turning the speed of the engine may be greatly ccelerated without fraying its edge. The metal has a compact, silvery appearance, but is too brittle to weld. With regard to its cost, we are not prepared to say what it may ultimately be, but as yet it is rather too expensive to be of general commercial utility. Of course, this and kindred other evils the inventors are studying to overcome, and they entertain reasonable hopes of succeeding. Their invention is protected, and in its present immaturity we cannot do more than wish them success.

A Boiling Lake.—In Monitor Valley, Nevada, a short distance south of Humphrey's Station, says the Reese River *Reveille*, there is a singular boiling cauldron, now known as Diana's Bowl, which is well worthy of a visit. In the centre of a low, round hill, composed of sedimentary matter, there is a natural bowl about seventy-five feet in diameter, and apparently sixty or seventy feet in depth. At the bottom there is a large volume of scalding hot water, constantly in active ebullition. The water is so remarkably pure that a stone thrown into it is seen descending with a slow spiral motion to a great depth, being gradually drawn toward the point where the spring seems to burst from the rocks beneath. The most singular feature about this hot spring is, that it does not appear to have any outlet, and yet its level does not seem to vary. The surface of the water is some twenty feet lower than the rim of the bowl, and can be reached only by the aid of a rope.

Gas from "Lightwood."

[The following article, it may be well to observe, was written immediately after the occupation of Savannah by Sherman's forces, and is published untouched. There may be some trifling inaccuracies in it, but the writer feels that any alteration might impair the fresh ness of his impressions as recited. The figures are all official.]

It is a common practice among Southern planters, simply to "girdle" the pine trees which cover the flat expanse of the Pine-belt, as the most expeditious method of rendering possible the cultivation of their estates. The leaves and smaller branches soon fall off, and the almost immediate return thus derivable from the soil more than compensates any want of beauty of landscape.

At a later day the dead trunks are felled, and the broad unbroken fields whiten with the cotton plant, or bear upon their denuded stretches the other Southern staples. In many cases, however, the stark trunks stand for years; and during this time is going on silently and mysteriously a change in all the texture of their wood.

The sap rots off from the outside, and in the heart the resin becomes consolidated, while all interior moisture dries out of the fibrous matter by simple atmospheric influence. It may be here parenthetically observed that the short-leaved or "loblolly" pine undergoes no such change, in degree at least, owing probably to the much greater percentage of fibrous matter in its structure, and is, with the numerous deciduous trees as well as the live oak, the magnolia and the cypress, comparatively worthless as a gas-producer. It is to the long-leaved or maritime pine that the sea-board cities of the South had during the war to look, to compensate for their exclusion by naval blockade from the coals of England or the North; and the spur of a keen necessity soon developed new elements of wealth in the vast forests about them. The long-leaved pine, of which the "loblolly" is the second-growth is, *par eminence, the* tree from Norfolk to Galveston for 100 miles from the coast its supremacy as a tree of the "forests primeval" being disputed in the river swamps, and in the brakes and jungles of the smaller water-courses by the growths previously mentioned. And there are too, here and there, wide patches of the "black jack," similar to, or perhaps identical with, the scrub oak of Long Island, but the tracts so covered bear but an insignificant proportion to the whole.

Now, these vast *original* pine forests, girdled and standing for years as described, become converted into what is universally known at the South as "Lightwood," a distinctive name which I shall employ hereafter, and which, from it frequent recurrence in this essay, I shall take the liberty of denuding of its quotation marks. As may be imagined, lightwood varies much in quality with the size of the tree and the class of the soil, and becomes a "poor stick" enough in south-eastern North Carolina where the trees have been tapped again and again for resin. The Wilmington Gas Co., (N. C.), could jot down a feeling record of their experience on this point; although even so, their yield *per pound* from lightwood surpasses that obtained by the other companies of the State from resin. But this is anticipating the due course of my story.

A cord of first quality lightwood, selected as to straightness and quality from a train-load of seventy cords, I found to weigh 3,550 lbs., although 2,800 lbs. is a proper average estimate for first class wood, taking Cutter's measure, which never holds out in re-cording, especially after a railway transit of fifty miles or over. In frequent instances, however, the weight of the wood is such that it will sink like a stone in water, although this seldom occurs, except in the case of the knots, in parts of which not a particle of fibrous structure is discernible. These knots are nearly indestructible, and are not unfrequently used to form the lower concave bearing, or "ink," in which works the upright shaft of the large spur-wheel of plantation horse-powers. They have also been employed to considerable extent as a substitute for brass or anti-friction metal in the journal-boxes of the Macarthy gins for the delicate long-stapled cotton. And as another way of putting a respectable article to a very questionable use, certain devotees of Bacchus there be who much belaud a pull of whiskey with splinters of lightwood steeped therein.

Now, the yield from lightwood is, without the employment of a regenerating (and *de*generating, softly be it whispered), retort about ten (10) cubic feet of 12-candle gas per pound. I have taken as high as 15 cubic feet of purified gas per pound from a selected charge of lightwood knots, and as low as 8 feet has been the maximum from wood of the poorest quality (lightwood). It will at once be asked by those familiar only with the non-resinous woods of the North, how it is *possible* that so large a yield of tolerable gas can be afforded by any tree, and this leads to the consideration of a question which has considerably bothered many thinking men at the South. It would be presumptuous in one who is neither chemist nor botanist to pronounce *ex cathedra* upon it, but I may (diffidently enough I must confess) state some well known facts with what seem to be legitimate, if not necessary, deductions therefrom. My facts then are

1. A tree felled while living never produces lightwood.

2. The greatest agent in producing lightwood is to found in the fires which annually sweep off the undergrowth, so attacking the trunks without being of sufficient activity to destroy them.

3. A stick of *first-class* lightwood is of greater specific gravity than any green wood of the same original species.

From these facts, and remembering that the maritime pine is the richest of all trees in resin, my conclusion is that the long continued action of the hot suns of the Southern climate, joined to the effect of the annual fires, drives in the resin towards the center, while the outer annuli of fibre scale off or rot off under exposure to atmospheric influences. This gradual process finally gathers almost all the original resin of the trees in the heart where the original moisture is displaced, and the process goes on until either the fibre is imperishably embalmed in resin and so preserved from exterior action, or until the tree itself falls before the axe or the hurricane.

If this hypothesis be true, then in the course of time all or any trees would finally become lightwood of equal quality; but I am aware that the quality of lightwood varies noticeably in a field all of whose trees have been girdled at the same time—varies, that is, as between tree and tree—and hence I am far from being satisfied with my own solution. Upon one point, however, there is no question; that *by some agency* the resin of the whole tree is consolidated and concentered in its heart. We are hardly right, then, in considering lightwood as a normal wood—it has lost a heavy per centage of its fibre, while it retains its resin—the resin which, even as compared with its original bulk, it possessed in higher ratio than do any of it's forest cousins. We have in a stick of lightwood a mass of the very richest hydro-carbons, together with just enough of fibre to act as a dispersing material; these hydro-carbons are in their original proportions and equivalents, except so far as they may have been altered by the chemistry of the sun and wind and forest fire. And while the residuum *by weight* is only 10 per cent. of charcoal, or about 16 per cent. including tar, there is yet nothing like fusion as accompanying the distillatory process. In a half-worked charge the sticks are separate and distinct, and the whole seems driven (so far as the heavy per centage of volatile matter is concerned,) into gas, without any appreciable fusion such as obtains with caking coals. Now, to make 10 feet of gas from *wood*, while but 6½ to 7 is ordinarily obtained from resin may seem rather Munchausen-ish; but when we reflect that the entire system of equivalents and relations in which the hydro carbons exist is destroyed in the distillation of turpentine, and that commercial resin is itself a residuary product, the chemist begins to think the thing possible. Again, when the success of the Aubin process for gas making from resin is considered, it is not an unlikely thing that the presence of fibre, in its natural combination with the gums, may exercise an important function towards the availability of lightwood.

Be these questions as they may, I present them in the hope that some professed chemist will deem it worth his while to examine and expound them.

Many readers will recollect an insane controversy some years ago, between the Superintendent and the Trustees of the Richmond (Va.) Gas Works, upon the subject of housing coals, in which Mr. Wynne was soundly berated and be-chemicalized for his common sense in insisting upon shed-room. In like manner it may seem to a tyro as if lightwood *wet* were the same thing as lightwood *dry*. This is very far from the case. It should be as carefully shedded and protected from rain as possible, on account as well of the quality as the quantity of gas obtained from it. And it may be stated as a collateral fact, that a marked difference in yield exists between wood recently split and that suffered to remain—although under cover—split a long time before using it in the retorts. The only reason for not using the wood for the retorts as it comes from the cutters is the objection which also applies to using coal of too large size in coal-gas making, viz: its difficultness of carbonization. Now, it has been observed that the gas coals which yield the highest product require the highest heats for thorough carbonization, a fact due to the greater heat absorbed by the greater volume of their product, and hence it might be inferred that wood would drag down heats very rapidly. Such is the case as a matter of fact, and from this fact the very nicest adjustment, *by weight*, of the charges, becomes an indispensable pre-requisite in the process. With a pressure-register—graduated to the natural scale—in connection with the hydraulic main, and observations of the station-meter at the end of every charge (each charge embracing all my working retorts), I soon ascertained that a difference of heat which was imperceptible to the eye, would vary the yield 10 per cent., and that an addition of 7 per cent. to the weight of the charge would in 12 hours leave the heats of the ovens so miserably low, as to render them unequal to anything like their full duty.

I was working, at the time of our adoption of wood-gas, clay retorts in most of the arches, but had soon to abandon them from the best of reasons, viz., that *wood-gas deposits no solid carbons*, and so I found a clay retort about as suitable for the new product as would a meter-crate have been. So back we went to the common iron Ω-shaped retort 20″ x 12″ x 8 feet long, with 4-inch stand-pipes, and without a single alteration except a modified setting (which I will hereafter describe) and a current of water through our hydraulic main. I found that a charge of 62½ lbs. to the retort, or 375 lbs. to two benches of Threes was *exactly* the thing, giving 6000 lbs. of wood (as the charges ran but 1½ hours) or 60,000 feet of gas in 24 hours from 6 retorts. It is true that upon one occasion our record for the day was 65,000 feet from 6,800 lbs. of wood with 6 retorts at work, but this was an exceptional instance. I believe, however, with the lights now before me, that a yield of 12,000 feet per day per retort could be obtained by a slight modification of the Savannah settings for wood. This setting is that introduced by Mr. Sabbaton of the Albany (N. Y.) gas works, for clay Threes, but with this one distinctive feature, that the flues under the bottom retorts, instead of being continuously 9 inches in width are flared out as they recede from the front of the bed until they attain a width of 19 inches at their angle of junction with the back cross flue. The return flue under the top retort flares in similarly from 15 inches at the back to 10 inches at the front. These points constitute the only variation except a slight enlargement of the ports and nostrils, the widening of the furnace to 18 inches, and the use of cast-iron grate-bars. For every cord of wood carbonized in the retorts, a cord was used as fuel; the same quality of wood being used for either purpose. Even in Georgia, the best quality of lightwood is not easily procured upon the sea-coast, and every effort was therefore made to use the ordinary pine in the furnaces, but it was soon found that the lightwood, despite its superior first cost, was incomparably more economical in the end. I am aware that the Charleston, Augusta, and Wilmington gas works have differed from me on this point in their practice; but the results of 5 feet from the gross pound of wood used and of 10,000 per day per retort of the size used, seem to warrant my position regarding the fuel question.

It will hardly be believed that the make from 375 pounds of wood in 6 retorts is, immediately upon the putting on of the lids, at the rate of from 150 to 175 feet *per minute*, which rate steadily and rapidly decreases to the expiration of the hour and a half. It required 7 minutes to draw and charge, and yet the make during the first half hour *from the slackening of the lids* was 2,200 cubic feet; during the second, 1,000 cubic feet; and during the third, 550 cubic feet. Now, passing this maximum volume per minute through 6 4-inch stand-pipes, and a cylindrical 13-inch hydraulic main, was no very comfortable performance at times, and I can speak earnestly upon the advisability of large bench connections in the use of lightwood. While working sadly along as I at first did upon the doleful dictum that "low heats are wholesome for wood-gas," the stand pipes had to be cleaned every eight or twelve hours; the yield of gas was poor in quantity and quality; the pumping of gas-holder and street drips a "big job;" and the item of unaccounted-for gas by no means microscopic.

But for all these nuisances I had only myself to blame; I listened to others instead of applying to wood gas the principle applicable to coal of high heats and short charges. And all lessened and almost vanished as I improved the setting and the system of charging, until the process became incomparably superior, so far as the comfort of its operatives and its general economy are concerned, to the coal-gas manufacture.

It will be remembered that the results obtained from wood some years since, at the Philadelphia Gas Works, implied a necessity of using a bushel of lime to each thousand cubic feet of gas; and this constituted an important objection in the anticipated use of wood gas. Lime it was next to impossible to procure; stone-lime could not be transported from the remote quarries of Alabama and Tennessee, for reason of the military occupancy of the railroads, so cutting off those sources of supply; while in all the sinuous channel-ways of the river delta were "gorgons and chimeras dire" in the shape of torpedoes, gunboats, monitors, and picket barges, which placed the question of "effectual blockade" almost beyond debate, so far as oyster shells were concerned.

The lightwood of Georgia, however, proved a very different article from the oak and shore pine upon which the Messrs. Cresson had been experimenting. A bushel of lime is ample for the *complete* purification of 4,000 cubic feet of lightwood gas, and indeed the Savannah Gas Co. sent out gas for two years, to which lime had been applied at the rate of only a bushel to 12,000 cubic feet.

And upon this point I would yet further state that some managers regard lime as practically useless in

making lightwood gas. Now this is all nonsense, as I shall presently show, but has its value as showing the enormous difference in value between the wood under consideration, and the available growths of the North. I pronounce it, however, rubbish, simply on its own merits, and as an intrinsic question, from the following conclusive fact: in turning on a clean box in the purifying house I found my make to fall off at once 14 to 16½ per cent., and that with the test cock of the incoming box in its place and turned off. This observation I have repeated perhaps fifty times, and always with the same result, within the above named limits of loss per cent. This loss is due to the absorptive power of the clean lime over the carbonic acid and oxide gases, which are in great part the only gaseous impurities of wood-gas, and over any tarry matter which may have escaped the condensers and washers. Now, for any man to claim that such a dose of carbonic acid and tar does not injure the illuminating matter of a gas is simply absurd.

There is, however, a flaw in my reasoning, the advocates of the cellular, or regenerating, or decomposing retort assure me; and in so open a discussion it is unfair not to give their solution of the case.

They tell me that my argument *ab analogo* is in no way pertinent, and that my frank confession of the character of *my gas* is the very strongest certificate (and all the stronger for being unintentional) that can possibly be given to the merits of *their retorts*. They say that the decomposing chambers of these so change the combinations of nascent gas as to leave little or no carbonic acid in it as such, and so my friends (for such they really are) sing new Pæans to things cellular.

I have to this only to oppose the stubborn fact that Mr. B. P. Brunner, whilome engineer and subsequently president of the Charleston, (S. C.) gas works, when called upon by the Wilmington, (N. C.) to advise them as to this very point, at once discarded the calls. Mr. Brunner was the first engineer who used the Cresson retort for lightwood gas, and his long experience in their management, and great ability as a gas-maker, go to render this practical verdict of his as strong a supporting argument as could well be adduced.

It must here be remarked, however, that lightwood gas is certainly more condensible than that from coal, a fact which I had the very best means of ascertaining by a temporary discontinuance of our public lighting. In mains which lose ten per cent. of coal gas registered, lightwood gas loses twenty per cent., and this is to a degree an argument against the latter.

In the above statement of retort-capacity reference was had to the employment of lightwood as fuel, and under these conditions a retort (in works of ordinary storage room) would be equal to the production of 270,000 cubic feet per month, for 12 months, or 3,240,000 cubic feet during its life-time. Now, it will be remembered that the total yield of retorts of this size (20″ x 12″ x 8 feet long) is with coal-gas usually estimated at 1,000,000 cubic feet, or for fair compensation take Mr. John Jeffrey's results of 1,500,000 cubic feet.

We here have, *with wood as fuel*, a gain of 1,740,000 cubic feet in the duration of a retort. If, however, such heat be preserved as will enable the engineer to work off 100 lbs. to the retort, the capacity of the retort (lasting 10 months) runs to the total of 4,320,000 cubic feet, an enormous total of production for even clay retorts.

This result, however, I confidently assert would attend the employment of coke as fuel, which could be done by works in which a mixed gas (from lightwood and coal) was made.

It would probably be found that the mixture of coals which would bring lightwood gas up to a 16-candle power would yield surplus coke sufficient to heat the wood benches, thus leaving the available residuary products of coal-tar, wood-tar, and charcoal. The charcoal, it is as well to state, is of the most indifferent quality, and would probably be found so unavailable as to render its most profitable employment that of burning shells for lime; that is, in cases where the gas company burns its own lime. While mentioning lime, I will state one trouble in the making of a mixed gas, viz., the development of chemical heat in the purifying house. During our transition from coal to wood, I was for some time in the practice of throwing a stick of wood into each retort, on top of the charge, but was compelled to discontinue it from the fact that my purifier covers became so heated as to be unpleasant to the touch, and that gas leaving the condensing system at 60° F. was registered, after passage, through 200 feet of 10-inch pipe at 70° to 80° F. Coal yields sulphur, and wood gives carbonic acid, and the gases from the two original substances should only be mixed *after* purification; yet even so, the interest upon the cost of an additional purifying system (the gases being mixed before measurement) would be a mere bagatelle compared with the economy of the process.

JAMES R. SMEDBERG.

HISTORY OF THE TELEGRAPH.—Professor Morse, the venerable inventor of the telegraph, is now residing in Paris with his family. His health is good, and he is busily engaged on a history of the telegraph.

Purification of Gas.

[From "Clegg on the Manufacture of Coal Gas."—Fourth Edition.]

(Continued from page 210.)

There were until a recent period no fewer than eleven different processes of purification adopted in the gas-works of the metropolis. The materials employed, the methods of using them, and the chemical actions that take place, are thus mentioned in the report of the Committee of the Metropolitan Association of Medical Officers of Health who visited the various gas-works in the autumn of 1856 and in the spring of 1857. The substances are named in the order in which the gas passed to them.

"1. Cream of lime; dry hydrate of lime; oxide of iron.

"2. Dry scrubbers, containing brickbats, etc., and 'gypsum material;' oxide of iron; dry hydrate of lime.

"3. Dilute sulphuric acid or acid solution of sulphate of ammonia: cream of lime; dry hydrate of lime; oxide of iron.

"4. A dry scrubber, containing coke; solution of muriate of manganese; dry hydrate of lime; oxide of iron.

"5. Water; oxide of iron; dry hydrate of lime.

"6. Solution of muriate of manganese; cream of lime.

"7. Oxide of iron (Laming's); a scrubber containing coke, over which water trickles.

"8. Oxide of iron (Hill's); dry hydrate of lime; a scrubber containing coke, into which a jet of steam is thrown.

"9. Dry hydrate of lime; oxide of iron.

"10. A scrubber containing crocks, over which water trickles; water; cream of lime.

"11. Scrubber containing coke and tan; scrubber of wet coke; oxide of iron; dry hydrate of lime.

"At the Surrey Consumers' Works the liquid when saturated is pumped into a settling tank, where the tar is deposited. The solution is evaporated and crystallized upon the premises. The vats for evaporation are heated by steam.

"Muriate of Manganese. The strength of the solution is about 4 or 6 lbs. of the muriate to a gallon of water, or 28° to 30° of Twaddell's hydrometer sp. gr. 1145 to 1150°. The solution is placed in a box provided with a central diaphragm or plate not reaching to the circumference of the box. The gas is introduced by a central tube below the plate, and is thus compelled to traverse some distance in contact with the solution, bubbling up round the edge of the plate so as to reach the upper and vacant part of the box, where it passes out. Two or three such purifiers are used. It goes first to the purifier which has been longest in use, and last to the solution most recently introduced. This process separate ammonia, converting it into hydrochlorate, which is run off under cover to barges for conveyance away. It was stated at the Great Central Works that from one-fourth to one-fifth of the sulphuretted hydrogen is also thus removed.

"'Gypsum material;' sulphate of lime. This salt acts upon the gas by a double decomposition; the lime combines with carbonic acid, while its sulphuric acid unites with the ammonia. Laming's oxide of iron, prepared by precipitation of the sulphate of iron by lime, necessarily contains this salt, and acts in a similar manner upon the gas. In the Chartered Gas Works it is the means relied upon for separation of ammonia.

"Oxide of iron. The preparation used varies at different works. An oxide prepared by precipitation (as Laming's, previously referred to) is mostly in use. At the Western Gas-works the oxide is prepared on the premises, by adding some of the ammoniacal liquor to crude green copperas. The oxide is usually mixed with sawdust, with a view to extension of surface, and to porosity. It is introduced upon four or five metal screens into air tight boxes. Where, as at the Chartered Gas works, the oxide is mainly relied upon for the purification, the gas is made to traverse three such boxes. Where other means are added, one oxide purifier is commonly considered sufficient; and in some works, where the use of the dry lime is conjoined, the upper screens contain dry lime, and the lower, through which the gas first passes, oxide of iron, both being in the same purifier. The effect of the oxide is to separate sulphuretted hpdrogen, a black sulphuret of iron being formed. The oxide is changed at intervals, varying in different works from 35 hours to 10 days. When removed from the purifiers it is 'revivified' by exposure to the action of the air, the oxygen of which decomposes the sulphuret, throws down the sulphur, and re-converts the iron into peroxide. It is then damped and again used. The duration of the exposure necessary for revivification varies with the age of the oxide and the length of time it has been in the purifier, from 24 hours to 15 days. It resumes each time its red color. The process of revivification is capable of very frequent repetition. The same oxide may thus be in use for many months, in fact until the sulphur precipitated accumulates in such quantity as to prevent the revivification of the oxide. Dr. R. D. Thomson has found the sulphur reach 45 per cent.

"Cream of lime; 'wet lime.' The apparatus used for this mode of purification mostly resembles that described when the muriate of manganese was mentioned. In the Phœnix Works (Vauxhall)—a model of the wet lime process—the gas is made by an arrangement of plates and bells within the purifier, to bubble three times through the wet lime contained in one purifier; the lime being prevented from settling by agitation effected by machinery. When the cream of lime is saturated, (viz. about once in 24 hours) it is usually run off into pits, where the lime may settle; the plastery matter which deposits being used for luting, sometimes alone, sometimes when mixed, for the sake of an improved consistence, with refuse dry lime. The cream of lime separates carbonic acid, sulphuretted hydrogen, and ammonia.

"The 'dry lime,' or hydrate of lime, is exposed on screens in a box to the action of the gas, in the same manner as the oxide of iron. It serves to remove carbonic acid, sulphur, and cyanogen compounds; and when other effectual means of separating ammonia have not preceded, becomes strongly charged with ammonia. When removed from the purifiers (usually every four or five days), it is commonly placed in a heap in the yard, and used for luting."

Since the expiration of the term of Mr. Hill's patent, oxide of iron has been used for purification in nearly all the gas works of London; generally with the addition of lime in the sieves of the last purifier, though in some instances without any.

By none of the processes of purification we have described, is the bisulphide of carbon effectually removed, nor has any process yet been discovered by which gas can be purified on a large scale, from that compound of sulphur. The Metropolitan gas companies have consequently been unable to comply with the conditions required by the Metropolis Gas Act of 1860, that the gas shall not contain more than twenty grains of sulphur in every 100 cubic feet. The gas companies who supply the city of London, applied to Mr. Barlow in 1854, to ascertain whether it was practicable by any known process to abstract the sulphur compounds so as to attain the required stand of purity. He and Mr. Ellison, the chemist of the experimental works of the Paris Gas Company, instituted numerous experiments with that object, but the conclusions they arrived at were not encouraging.

It had been supposed that the formation of sulphur compounds in the gas had been promoted by the excessive heats of the retorts, and the prolongation of the distillation, but the experiments proved that the results were not materially affected, either by the heat of the retorts, nor by the usual processes of purification; and that there was an equal quantity of sulphur in cannel gas as in that made from ordinary Newcastle coal. One of the anomalous results obtained in the experiment was, that the quantity of sulphur present in a coal does not bear a proportion to the quantity of sulphur compounds in the gas produced from it. Thus it appeared that gas obtained from Denain coal, from the neighborhood of Valenciennes, which contained 31·10 lbs. of sulphur in one ton, gave a maximum of only 7·48 grains of sulphur per 100 feet; while the gas from Staveley coal, which contained not more than 26·45 lbs. of sulphur in a ton, yielded 22 grains of sulphur in 100 cubic feet. In the experiments by Mr. Barlow, the process patented by the Rev. Mr. Bowditch, of passing the gas over heated lime was tried, but it was found to be not satisfactory, and not applicable economically on a large scale. The reports of Mr Ellisen and of Mr. Barlow, concurred in stating that beyond taking the precaution of picking out the lumps of pyrites from the coal, no means yet proposed for removing sulphur compounds from gas appeared to give a satisfactory result.

Since the experiments by those gentlemen, the subject has been investigated perseveringly and ably by Professor Anderson, of Queen's College, Birmingham, whose experiments lead him to conclude that the bisulphide of carbon may be removed by copious and repeated washings with concentrated gas liquor. Elaborate accounts of his investigations have been communicated to the *Journal of Gas Lighting*, from which it appears that by passing the gas three times through sulphine of ammonium the quantity of sulphur was reduced from 12·40 grains to 3·83 grains per 100 feet, and the whole of the sulphur was removed on a fourth washing. Experiments were afterwards made by him on a large scale at the Taunton Gas Works, to ascertain whether the illuminating power of the gas was diminished by the process, and they confirmed the opinion that it is possible to remove nearly all the bisulphide compounds from coal gas when very strong ammoniacal liquor, containing an excess of sulphuretted hydrogen, is employed in the scrubber. In some of the experiments, indeed, the illuminating power of the gas seemed to be improved by the process. Any alkaline sulphide, it has been ascertained, will produce the same effect, and it has been proposed to use soda waste, which is a refuse product of the manufacture of carbonate of soda, for the purpose.

(To be continued.)

Practical Management of Gas Works.

[Written Expressly for this Journal.]

NUMBER THREE.

It is a very general custom to employ three bearers to carry the grate bars. If, however, any manager who pursues this plan will notice the destruction of his grate bars, he will find that they burn through most rapidly *just behind the center bearer*—a fact probably arising from the occurrence of an air-eddy at that point. Hence, this bearer is a source of positive loss, while the heavy bars of 1¼-inch square iron are abundantly strong to carry the weight of fuel without any intermediate support, even in case of a 4 ft. 4 in. furnace.

It is advisable to employ large blocks, instead of fire-brick, for the side walls of the furnace. The plan was employed by some French engineer, whose name I do not at the moment recollect, and was first adopted in this country in the settings of fives and sixes at the Manhattan Gas Works. This mode of construction saves labor in the first instance, and is actually more durable, because exposing fewer joints to the searching heat. It might reasonably be supposed that these large blocks would be apt to be less homogeneous in their structure than fire-bricks, but such is not the case, or, at least, the difference is so slight as to have no sort of practical value.

The furnace ought to be so constructed as to facilitate the replacing of its lining when destroyed, or so far impaired as to involve waste of fuel, without disturbing the retorts. And this is a very important matter, considering that clay retorts last very much longer than any furnace which our knowledge of refractory materials at present enable us to devise, and would otherwise have their "life-time" limited by that of the furnace.

In considering the setting of the retorts, it may be well to remark generally that the whole system of gas-lighting in America hinges upon other issues, and looks to other economies, than those which obtain in English practice. In London, the best Newcastle caking coals cost but 8s. 6d. (or $2 65) per ton, and the Wigan cannels say 21s. (or $6 55) per ton, while the great companies of New York pay about $10 per ton for the mixture of caking and cannel which they use. Hence, the American engineer who takes less than 10,000 cubic feet out of the ton is looked upon as wasting coal, and our settings contemplate the use of the very highest heats attainable. Again: coke sells at a higher price (relatively to the first cost of the coal) in England than here, and economy of fuel is less important with us.

So in England the average yield per ton, with the metropolitan companies at least, averages but 9,300 cubic feet. Our retorts are larger—they are less carefully shielded from the fire—the furnaces are very much more capacious, and the true conditions of success are secured by very high heats. No instance has ever come to my knowledge of the employment of Anderson's combination settings, simply because we can give full duty to any heat by a setting of large sixes, and so have none to spare for a supplemental arch of irons.

The best American results with which the writer is acquainted show, as has been previously stated, a fuel percentage of 32 7-10. What a contrast to English figures of 18 or even 20 per cent.!

Starting, then, from the position that the duration of the retorts and economy of fuel, alike yield in importance to the question of high gas-product per ton, we have naturally been led to adopt "open" settings—settings, that is, in which the flues are few and simple; and the retorts comparatively unshielded, and without the supporting rings of brickwork, which are common in England. Clegg's "Manufacture of Gas" (4th Ed'n pp. 120–1 seriously states that

"Clay retorts, unless encircled by frequent thick-
"nesses of brickwork, would crack, and probably break
"down. In most gas-works, the fire brick partitions
"or bonds are built completely round them, at distances
"of from one foot to fifteen inches for their whole
"length."

Hughes, (2d Ed'n, p. 107) tells us the same thing, referring to Methven's setting of "through" Tens as a case in point, and adds that "On the continent these (the bond walls) are always dispensed with—the retorts, usually made in one piece of 8 or 9 feet long, only being supported by the pillars on which they are placed."

An adaptation of Mr. George Lowe's setting of clay fives has been generally adopted in this country, and the following remarks upon its features are quoted from a letter by Mr. Jos. A Sabbaton. The letter has been published in pamphlet form, and embodies an unvarnished statement of the treatment and use of clay retorts in the largest American gas-work:

> In placing a bench of five retorts, I have adopted the open setting, with return flues underneath the bottom retorts. The furnace is open at the top, the flame passing to the oven through spaces left between the bottom and middle retorts, and between the middle and top retorts, so descending to the bottom flue. The retorts are supported one by the other, resting on bridge tiles, the intervening spaces serving for the passage of the flame from the furnace. * * * When in good condition, a retort will carbonize 230 pounds of coal in 5 hours, the dimensions of the retort being 8 feet 7 inches long outside, 20 inches by 12 inches inside measurement, and of the ordinary D-shaped pattern.

This setting possess the essentials of economy in first cost, uniformity of heat, and simplicity of arrangement. But one objection applies to it, and that possesses dubious force: the fact that the two bottom retorts support the weight of the three upper ones. It is now the fashion to throw the arched roof of the retort from three centers, instead of making it a true semi-cylinder—the object being to gain coal room;—and this change of shape, of course, operates in a degree to weaken the retort. Hence, it is well to brace and stiffen the middle and lower retorts by arch tile thrown across from one to the other of each horizontal pair, and the shaping of the side chocks in such way as to furnish auxiliary supports at the points affected by the superposed weight. This shows, in fact, an approximation to the English view which Clegg indicates, but accomplishes the result with less obstruction of draft, and with less first cost of labor and material. The furnace is constructed of blocks 19½ inches long, 10 inches wide, and 5 5-16 inches deep, which last figures correspond precisely with the height of two courses of fire-brick, *as laid*. It has a width at the bearers of 12 inches, is flared out to 15 inches, and then drawn in by an equal, though reversed slope, to 12 inches at the level of the bottom retorts.

In the earlier arrangement of this setting, all the retorts were protected by floor tile of 2 inches thickness under their whole length. At present, however, there are no such intermediate tile between each pair of the saddle and bridge blocks which carry the three upper retorts, the lower retort alone being thus guarded and supported by the continuous tiles which cover the lower flues.

The size of furnace mentioned above will not suffice for a setting of sixes, which require a furnace of 3 inches greater grate-width, or one superficial foot of added grate-area, the slopes of the walls being the same. But when it is considered that a semi elliptic arch is more advantageous for the reception of the two upper retorts of sixes, the unquestionable weakening of the skeletons may destroy the advantage of *very small* saving in fuel as compared with the fives. And before leaving the setting of fives and sixes (they are substantially the same) it may be well to interpolate the following comparative statement of experiments on an enormous scale in the Manhattan Gas Works:

	Irons.	Clays.
Charge of coal per retort...	200 lbs.	228 lbs.
Coke-yield per ton.....	40 bush.	40 bush.
Coke used as fuel per ton..	20 bush.	13 bush.
Percentage of fuel used....	50	32½
Gas made per ton.....	9,500 c. f.	10,000 c. f.

A substantial and admirable setting of threes is secured by the simple removal of the two middle retorts with the saddle blocks which carry them.

I subjoin a statement of quantities for the setting of fives.

Bricks, blocks and tiles required to build skeleton bench from two courses above ash-pan, ready for filling.

1600 "extra" fire-brick, for piers, back & flue of chimney.
470 do. do. for upper arch.
450 "arch" do. for lower arch.
24 "skew-back" do. for do.
5000 red bricks (8″ x 4″ x 2⅝″) to fill in above arch.
1404 lbs blocks and tiles.
5½ casks common lime to fill in the red brick.
5½ cubic y'ds building sand do. do.
3 casks fire-clay to build piers, back and flues.
5 do. ground fire-sand for do.

Note.—*The above does not include anything for 2 end piers of range, nor foundation.*

Bricks, blocks and tiles required to fill in skeleton bench from top of ash-pan.

160 "extra" fire-brick, for furnace.
135 "No. 1" do. for paving flues, two courses.
425 "No. 2" do. for front and under grate.
80 "split" do. for filling in backs of retorts.
1300 red brick (8″ x 4″ x 2⅝″) to fill in around furnace.
5065 lbs. blocks and tiles.
1½ cask common lime to fill in red brick.
½ cubic yd building sand do.
1½ cask fire clay for fire-brick, blocks, etc.
2½ do. ground fire-sand for do.

Note.—*The fire-brick for the setting should be 9″ x 2⅝ x 4½″, and 8 of them laid dry make 21 inches.*

The Norwich setting is substantially the same as the Sabbaton threes, but possesses the following distinctive features, which were first adopted by J. K. Brick, Esq., and are still advised by his successor in business:

1st. The top retort is not carried on bridge blocks which span the furnace, but rests on a back-pier and the facing wall. The tile under it *do not touch it*, but are within half an inch of it, being carried upon side walls of 3-inch brick having suitable flame-ways, and resting upon the shoulders of the furnace.

2d. The lower retorts are similarly supported back and rear, and stand 3 inches clear of the flue cover, which space the flame enters and traverses at will before descending to the escape flue. Upon the tiles which cover the flue rest two or more 2½-inch blocks of 9 inches square.

The principle observed in this setting is due to the *expansion* of most American clays, and the claim of its promoter is that it is better to have everything in its place *after* the bench is at its working heat than *before*.

What slight preference I have is in favor of the simpler and less costly arrangement; but either is good enough for any gas-maker who has intelligence and experience.

General Summary.

[Compiled for the American Gas-Light Journal.]

Gas in Paris.—The revenue of the Parisian Company for Lighting and Heating by Gas amounted in the first eleven months of 1867 to $5,793,960, as compared with $5,242,040 in the corresponding period of 1866, showing an increase of no less than $551,920. This increase in the company's receipts to November 30th last year was thus at the rate of 10.53 per cent.

How to Deal with "Greek Fire"—Amid so many Fenian alarms (more than there are sufficient grounds for), a reassuring voice is heard from Dr. Henry Medlock, who is satisfied that "Greek fire" is not so dangerous as it has been represented to be. It consists of phosphorus dissolved in bisulphide of carbon. When thrown upon any combustible material the liquid rapidly evaporates, and the phosphorus then bursts into flame, evolving suffocating vapors as phosphoric acid. Water will only temporarily extinguish the flame, which bursts out again when the water dries up; but the so-called Greek fire may be immediately and permanently extinguished by a solution of common washing soda—one pound to a gallon of water.

A Norwegian application of the Cornish jacketed steamboiler to ordinary cookery is at present the subject of experiments by the Society of Arts. The article was exhibited at the Paris Universal Exhibition. It consists of a saucepan without a projecting handle and with a tight lid. Into this saucepan a piece of meat is placed, with a sufficient supply of water or stock. It is brought to as rapid a boil as possible, and then packed into a felt-lined air-tight box. There it remains for three or four hours, and on being opened, the stewing process is found to have been performed to perfection. If on full experience this arrangement should be found adapted to domestic use, it will be most easily applied by the assistance of gas. Cooking by gas is not usually an economical process, but in this instance, where a sharp fire for a short time is needed, a well-arranged ring of gas will be found cheaper than a coal or coke fire. For an army on march, this invention will be of great value. The jacketted kettles may be conveyed in wagons, and the soldiers sit down to a hot meal, without further preparation, at the first halt.—*Lon. Jour. of Gas Lighting.*

Employment of Hydrogen Gas.—M. Heurtebise communicates to a late number of *L'Invention*, a plan for producing and economically employing hydrogen gas, which is both new and valuable. He places charcoal in a retort and raises it to a red heat, then passing a stream of carbonic acid over it, each molecule of the acid absorbs two atoms of carbon forming two molecules of oxide of carbon. In another retort, heated red hot, he passes two currents, one thus obtained, and another of superheated steam, when two atoms of carbonic acid and two equivalents of hydrogen gas result. The carbonic acid gas is again passed over the heated charcoal and four equivalents of hydrogen are obtained. A continuous action is thus kept up, with a steady supply of hydrogen.

—It is a beautiful saying of somebody, that "gratitude is the music of the heart when its chords are swept by the gentle breeze of kindness." Many hearts, however, might as well be strung with hay rope for all the music of gratitude that ever comes from them.

Correspondence.

The Proposed Convention.

NEW ORLEANS GAS-WORKS,
NEW ORLEANS, 4th Jan., 1868.

MESSRS. M. L. CALLENDER & CO.:

* * * In regard to the proposed Convention of gas engineers and managers of this country, I am of opinion that the idea should be encouraged. I have obtained much valuable information from the last report of the British Association, held July 9th, 1867. I also consider that much valuable information could be obtained from a similar association, composed of such gentlemen as Messrs. Roome, Sabbaton, Col. White, the venerable Cresson, of Philadelphia, and others of equal experience and ability. Yours truly,

WM. MCCULLOCK.

ADRIAN, MICH., January 8, 1868.

MESSRS. M. L. CALLENDER & CO.:

Gentlemen: I accept the invitation extended by you to endorse the proposition made to hold a Convention of gas engineers and superintendents, believing such a Convention would result most advantageously to those engaged in the manufacture of gas. As to time, I would prefer April or June.

Respectfully yours,
J. F. NEWELL, Supt.,
Adrian Gas L. Co.

MADISON, IND., Jan. 10, 1868.

EDITORS AMERICAN GAS LIGHT JOURNAL:

* * * Your suggestions concerning a Convention of gas engineers and superintendents I heartily approve of, as I am young in the course, and desirous of an interchange of views on the various systems of managing gas-works, and the almost innumerable things pertaining to the manufacture and distribution of gas. I would suggest Cincinnati as a suitable place, and the middle of May as the best time to hold a Convention. And to pay the expenses, I would suggest that a small percentage of the capital represented be levied for the purpose. Yours, JOS. TODD.

COLDWATER, MICH., Jan. 15, 1868.

M. L. CALLENDER & CO.:

Sirs: Enclosed please find $3 for one year's subscription to the Journal. We have taken your paper one year, and it has become a necessity with us. As to the Convention spoken of at different times, let us have a Convention by all means. Such a meeting once a year would be worth thousands of dollars every year to the gas interests, more especially to the smaller works throughout the country. Yours truly,

R. M. WILDER, Supt.
Coldwater Gas Co.

BLOOMINGTON GAS-LIGHT AND COKE CO.,
BLOOMINGTON, ILL., January 9, 1868.

EDITORS AMERICAN GAS-LIGHT JOURNAL:

Gents.: In your issue of Jan. 2d you were kind enough to notice our little works "out west," but not so little as some folks think. You say our works have been repaired, etc. etc., which is a mistake. We have an entire new works (the old works having been abandoned) erected by A. Gridley, under the supervision of the well known engineer, Mr. Pratt, of the St. Louis works, at a cost of over $90,000. Our castings and machinery came from Vermont; our connection are all of 8-inch pipe, 10 benches retorts (4 running), large scrubber and washer, full set 8-inch condensers, 4 purifiers 8 by 9, 8 inch dry centre seal, tank 60 by 22 feet, boiler and steam pump; are using Pennsylvania coal; have ground to double the capacity of everything when necessary We have seven miles of street main, over 400 consumers, about 170 street-lamps, and good prospects for more extensions and increase of consumers the coming Spring. Our lime we have to get from St. Louis, 152 miles south of here, and our coal coming from Pittsburg by way of Cairo—makes material rather expensive. The charge for gas is $5.00 per M., government tax not added, and no meter rent. The entire concern is owned by Col. Gridley, who is a prominent banker here, and one of the most enterprising citizens in the place. Should you ever come "out west" give us a call. Respectfully yours,

C. W. DOUTY, *Superintendent.*

OFFICH NORWICH CITY GAS CO.,
January 20, 1868.

EDITORS AM. GAS-LIGHT JOURNAL:

Dear Sirs: I notice in your issue of the 16th inst. a reference by J. R. S. to the working results of this company, and believe that the following items *from our books* will be interesting to your readers, as going to corroborate his statements.

During last September I was working one bench of three retorts of the manufacture of J. K. Brick & Co., all nine feet long—the two lower being 26 x 15, and the upper 30 x 15, set in an arch of seven feet span.

Our results for the first sixteen days of the month named were as follow:

Coal carbonized	73,200
Gas made	332,200

giving an average of 6.921 cub. feet per diem per retort, 4 54-100 cubic feet per pound, or 10.170 cubic feet per ton, the coal being 14 per cent Wigan Cannel, 43 per cent Lancashire Coking, 43 per cent. Newbeng Orrel Maximum make per diem per retort, 7,533 cubic feet. We, of course, have no exhauster.

Very respectfully, O. G.

BROOKLYN, Jan'y 25, 1868.

JAMES R. SMEDBERG, ESQ., C. E.,
New York City.

Dear Sir: It may be of interest to communicate the following working results, secured by the Seneca Falls Gas Co. (N. Y) during the month of November, 1863, the retorts being of our make:

Retorts at work	3
Dimensions of retorts...14 x 24 in. and 9 ft. 4 in. long.	
Coal used	140,200 lbs.
Gas made	581,600 "
Span of arch	6 ft 6 ins.
Yield per pound	4.16 c. feet.
" " ton	9,318 "
" " per day per retort..	6,462 "

Maximum daily make of bench, 20,500 cubic feet, or 6,833 cubic feet per retort.

No exhauster.

Very truly,
J. K. BRICK & Co.

McHenry & Carson's Gas Fixture, Lamp and Plumbers' Depot,

No. 8 EAST FOURTH STREET & 162 MAIN ST., CINCINNATI.

AN EXTENSIVE ESTABLISHMENT.

[From the Cincinnati Gazette, Dec. 28.]

The merchants, the real, practical and thorough working men of Cincinnati, cannot certainly be accused of inactivity or lack of enterprise. The many fine improvements which we have occasion to note daily would refute the idea. These improvements steadily increase the importance of our city. Few who have occasion to pass along Main street can have failed to notice the new, solid structure which has been erected by Messrs. McHenry & Carson. This building is an ornament to Cincinnati, and with others that are now going up on the same street, will soon transform the old aspect of that established thoroughfare, and modernize it to the fullest extent. The house of the above firm was established in 1856. Their old establishment, at No. 8 West Fourth street, is one of the most attractive stores in the city. They have now opened a connection between their old store and their new one. The dimensions of the old establishment are—100 feet deep by 28 feet wide, and the new—100 feet deep by 16 feet wide, with a ceiling to both stores 16 feet in height.

Such an establishment affords immense facilities for the carrying on of an extensive trade.

THE OLD STORE.

In the old store the finest stock of everything new and desirable in the gas fitting department can be found. The large stock of elegant chandeliers, all of which have been selected with regard to their excellence of material and beauty of design, cannot fail to please the most refined and fastidious taste. A gas fixture being a permanent fixture, should have a beauty of its own to make it attractive. How often do we find in private houses, and even public places, fixtures that are entirely incongruous and out of place, compared with the other decorations of the place. Again, who has failed to remark the harmony produced in a room properly and fittingly furnished with the indispensable gas fixture or chandelier. To arrive at good taste in such matters it requires the experience of men who make the business a study. McHenry & Carson show a taste that cannot be questioned with regard to the fitness of the designs they recommend for both private and public houses. Look at the fixtures in the beautiful new building called the Masonic Hall; they are in keeping and harmonize with their surroundings, consequently produce a most pleasing impression. We might also enumerate the new Masonic Temple and Pike's new Opera Hall. These gentlemen put the fixtures into those places, as well as many of our finest private residences and churches, and every place that they have fitted up presents the same pleasing appearance of those that we have mentioned. Their stock of chandeliers, pendants and brackets are the most extensive that can be found in any house in the West. Their chandeliers, ranging from two to twelve lights, include all of the very newest designs and patterns that have been recently introduced. In

THE SALESROOM

a sample of each of the different kinds can be seen. Some are finished in French bronze, others are in the verde antique style, others in gilt, and others again in combinations of gilt and bronze and gilt and glass. These are again ornamented with cut glass globes of as many varieties of design as the fixtures themselves. Many of these globes are samples of the very finest specimens of glass ornamentation, which is an art that has held a high place for centuries. The enameled French globes causes a soft, mellow and beautiful light, which is not distressing to the gaze, but produces in an apartment the most appreciable sensation. They throw a warm and genial light, which makes a person feel comfortable. The grand variety of these shades, to be seen at McHenry & Carson's is really interesting, illustrating as they do the high taste and refined requirements of the community. We noticed a nine light chandelier in this establishment, a drawing of which was published a short time ago in the London Art Journal. The style is purely an American one, and received at the hands of that journal the greatest praise. It is entirely different from all the ordinary styles to be seen, and is certainly a very handsome decoration.

BRONZES.

The same taste displayed in the assortment of fixtures is to be seen even more strikingly in the large collection of elegant bronzes, which are arranged artistically around the walls of the salesroom Some of these figures intended to ornament the corbels of staircases, and at the same time act as gas fixtures, thereby making themselves useful as well as ornamental.

We have lately had occasion to notice handsome collections of bronzes in various establishments in this city, and we can say that a more tasteful one we have not seen anywhere than here. They are of all sizes, and represent all ages, from the Roman and Grecian warriors, clad in mail, to the characters of our own day. Parties who like to see handsome work of this class will not be disappointed in examining this large stock

KEROSENE LAMPS.

Of kerosene lamps and lamp trimmings there is an immense stock. This house does a large wholesale and jobbing trade in this line, and consequently their stock embraces every kind that is manufactured. The highest skill and artistic workmanship is brought to bear in the manufacture of this class of goods, and to say that they are highly ornamental is saying nothing; there are some of them really superb, and we know of no more useful article of furniture in a house where gas cannot be used than a beautiful lamp. A person that would take a look at a collection of these lamps, richly gilt and decorated with fancy globes of glass in white, crimson, green and other colors, would almost be reminded of the dazzling wonders produced by the wonderful lamp of Alladin. Certainly art and ornamentation has done its utmost in this department, for a more beautiful collection than that to be seen at McHenry & Carson's, we do not expect to see anywhere. Another feature in this department is the chandeliers, constructed for burning kerosene; they are in all respects gotten up in as fine style as the gas chandelier, and in a country mansion one cannot miss gas when these are used. The stock of these chandeliers is also very large, and embraces many new styles only recently invented.

LANTERNS.

Every kind of lantern required by railroads, farmers, stable keepers, house-keepers, and every other class of the community, who require their use, can be found here, of all sizes and at all prices. In this department their stock is complete, both to supply private customers and the trade.

CLOCKS

In every variety, from the plainest to the most ornamental, can also be seen in the salesroom. They are mostly imported, and are guaranteed to be good time keepers.

THE BASEMENTS.

The basements of both stores run the whole extent of each, and are connected as the stores, with each other. In this department is crammed all the different articles for carrying on the business, as well as the stock to replenish the salerooms The basements are large, airy and roomy, and afford fine facilities for packing the different kinds of goods. They are fitted up in the best manner to insure the speedy transaction of business. The order here displayed is the same as is seen all through the establishment.

THE THIRD FLOOR.

The third floor is used for the finishing, designing, burnishing and fitting rooms. A large number of the best workmen are kept employed in this department. All of the alterations required to make fixtures correspond with the places they are needed for, is done in these rooms. Old fixtures, no matter how dirty, soiled or worn they may be, are here re ornamented, re-burnished and made good, looking as new. Chandeliers

that may be considered almost useless, are here altered and fixed up again, and made serviceable for years.

THE NEW BUILDING,

on Main street, comprises two handsome stores, one of which is occupied by Mr. J. Strobel, the extensive picture and looking-glass manufacturer. The other is occupied by McHenry & Carson as the

PLUMBING DEPARTMENT.

Here can be found not only every article needed in this extensive branch of trade, but all the tools of every grade and style and size, required to do the work with. The trade will here find everything complete. It is a regular plumbers' depot, where nothing is wanted. A man will have no occasion to go to any other store in the city to look for any goods in this line, as the stock embraces every conceivable thing required, and the largest and most complete assortment of them. The new store is handsomely fitted up, no money being spared to make it the principal plumbing depot of the city. The stock of goods required by steam fitters, and the tools required for the prosecution of that branch of the business, is as extensive as that in the plumbing department. McHenry & Carson sell everything in this department as cheap as any house in America. Having ample capital at their command, they make it a point to keep the largest stock, and buying directly from the manufacturers, enables them to sell their goods at the lowest prices.

THE STORE ROOM.

In addition to the accommodations enumerated, the firm have a workshop and store room, which are situated at No. 135 Sycamore street. Here all the different sized pipes for gas fitting, steam fitting and plumbing is kept in stock. Machinery of the newest description is set up for cutting, threading, etc. The facilities for executing all kinds of work ordered and required to be done promptly, are here arranged in systematic order. No house could possess superior accommodations in this respect.

THE GENERAL ASSORTMENT

of goods in all the departments is complete. This house offers inducements to parties that they cannot find in houses East. Many people are surprised, after having visited New York and other cities, when they visit McHenry & Carson's establishment, for here they find everything they want, while in the East if a person want to buy a general stock of goods in their line they have got to go to the gas pipe manufacturers for gas pipe, to the gas fitting manufacturers for gas fixtures, for brass goods to the brass foundry; while here they can find everything in one house, and in many cases can buy much cheaper than they can do East. The firm also deal in gas meters, and are the agents for the American Meter Company.

Our merchants who visit this establishment will find it replete with everything they need in the above enumerated departments of business, and in it they cannot fail to be suited with regard to variety and prices.

Late Mining News.

[Compiled from our Exchanges of December 28.]

ALPINE CO., CAL.—The silver Creek Mill is grinding up Tarshish ore preparatory to turning out a batch of silver bricks next week. The drift south from the shaft of the Tarshish, 75 feet below the tunnel is encountering large quantities of first and second class ore.

Native copper in metallic granules has been found in the Leviathan mine. It is found in a brown ore, or oxide of copper, and is easily smelted.

AMADOR CO., CAL.—The week ending Dec. 21st, the owners of the Kennedy mine cleared up a "run" of 110 tons of rock and received $3,500—an average of about $32 per ton of pure gold, while the sulphurets, which are known to be rich, are not taken into account

CALAVERAS CO., CAL.—While the hands at work in the mine of Bovee & Co., at Angels, were away from the shaft, at dinner, a huge cave occured in the shaft which disclosed an entirely new vein of fabulous richness—the existence of which the proprietors and workmen had until then been perfectly ignorant. Threads of gold were literally spun through the rock; it appeared like quartz pebbles strung on threads of gold.

Fowler, Sanborn & Co. recently discovered a lead of plumbago, about a half mile from San Andreas. The lead is from four to five feet in thickness.

MENDOCINA CO., CAL.—Silver mines have been discovered on Eel River.

NEVADA CO., CAL.—Rich diggings have recently been struck by a party of miners, about three miles from town, on the old road to Jones Bar. The company have been at work sinking a shaft, and a few days since they struck gravel containing an abundance of coarse gold. Quite a number of claims are located in the vicinity.

The Gold Hill quartz mill at Grass Valley has been doing a very good business of late in crushing quartz boulders picked up in the bed of Wolf Creek and other places.

During the last week (Dec 21st) all of the leading mines about the town have been doing well in taking out rich rocks. The New York Hill mine has largely overpaid its expenses with rich specimens alone. The Empire in Ophir Hill is turning out quartz which will go up to a handsome figure. The Eureka and North Star are making their usual rich returns. Taken altogether, the mines around Grass Valley for the past week have exceeded any week's yield for several years.

PLACER CO., CAL.—Judge Brown has taken out of his claim lately, as high as $5000 in five and a half day's run, and at no time less than $4000 a week. The Judge is taking out dirt about four feet high, and finds gold in more or less quantities through all of it.

COLORADO.—Until recently Gold Hill was looked upon as gold-bearing exclusively, but now it is discovered by testing lodes which seemed worthless in early days, that the district is richer by far in silver. From Gold Hill eastward to within a mile of the out hills, silver indications are abundant. Some rich discoveries have recently been made within three miles of Boulder city, one yielding $120 per ton by assay from the blossom rock, with a mass of solid ore five feet thick.

IDAHO.—The richness of the Oro Fino ore increases with depth of working. Gold is visible in a large portion of the quartz in the vein. The Morning Star mill is kept constantly at work on ore from the mine.

The Elk Horn Co. have declared a dividend of $3 per share. The last clean up yielded $9,000 in gold bars.

MONTANA.—The Montana *Post* of December 7th says, Boom & Holeter cast a gold brick of the value of $21,154.41. The silver bricks on exhibition at the First National Bank, make a poor devil wish he was in that kind of brick making business. There were six mammoth fellows, the total valuation of which was something over $9,000.

Mr. F. B. Collins has placed on exhibition at the office of the *Post*, a fine lot of sapphires and other gems from El Dorado Bar, which are pronounced by lapidaries and gem dealers at the East, to be as fine as any sapphires ever found.

PATENT CLAIMS.

Pertaining to Gas, Mining, Petroleum, Water, etc.

73,436.—GRATE-BAR FOR FURNACES.—Geo. H. Clarke, Brooklyn, assignor to the Salamander Grate-Bar Company, New York, N. Y.

I claim the arrangement of the locking-rod, B, and recess, C, in combination with the interlocking bar, A, the whole constructed and operating as set forth and specified.

73,506.—HYDROCARBON BURNER.—Frederick Cook, New York, N. Y.

I claim, 1. The introduction and distribution, by centrifugal force, of liquid hydrocarbons into furnaces as fuel, substantially as shown and described.

2 The introduction and distribution of water, in combination with liquid hydrocarbon, into furnaces by centrifugal force, substantially as shown and described.

3. Also, the revolving distributer, D, with its head, F, constructed, arranged and operating as and for the purpose set forth.

73,521.—MANUFACTURE OF ILLUMINATING GAS.—Robert M. Fryer and Andrew R. Fryer, New York, N. Y., assignor to National Gas-Light Co.

We claim, 1. The process, above described, for manufacturing illuminating gas, which consists in distilling the coal at a low heat and converting the distillate and condensable products into gas, in separate benches or retorts, substantially as described.

2. The process of converting the volatile products or fluids given off from the first bench of retorts into gas, by subjecting the distilled products to the different temperatures required to convert the same into gas, substantially as set forth in the foregoing specification.

3. The construction and use of the automatic seal-valves, which are employed for the same purpose, and instead of the ordinary hydraulic main of gas-works, substantially as above set forth.

4. The manner of distributing the distilled products or fluids given off from the first bench of retorts, equally to the several gas-producing retorts, by means of the several traps and connections, substantially as above set forth.

5. The manner of separating the gas, generated in the second bench of retorts, from such fluids as escape conversion into gas in these retorts, and the method of passing the gas thus generated into pipes leading to the gasholder, while the fluids are conveyed directly into the third bench of retorts, where they are subjected to a higher heat, necessary to convert the same into gas.

6. The combination of the whole gas-generating apparatus, as described in the foregoing specification, and for the purpose therein named; and this we claim whether the constructed apparatus be precisely in the form described by us, or otherwise, if it produces substantially the same results.

73,534.—GAS-COCK.—Peter Keller, New York, N. Y.

I claim 1. A gas-cock, which, when opened, forms a space, *d*, and an annular chamber, *e*, substantially as and for the purpose described.

2. The arrangement and combination of the pipe, B, with a perforated tip, adjustable shell, C, and bulb, A, substantially as and for the purpose set forth.

73,537.—WATER METER.—William Livingstone, New York, N. Y.

I claim, 1. The construction of a water or fluid meter, consisting of a measuring vessel or cylinder, enclosed in an outer casing or jacket, the intervening space or spaces forming the water-ways to and from the measuring cylinder.

2. The combination of a piston with jointed plates or bars, or other proper flexible material, that will extend and close up with the motions of the piston, and give positive action to the valves at either end of the stroke.

3. The combination of a piston and intermediate flexible attachments with the valves, either slide-valves or other valves, by means of the rod, F, and its inclined plane, S, working the valve-rod, E, or, by means of a bell crank or other lever, taking motion from the piston at certain points of the stroke, and transferring the same to the valves, substantially as described.

73,682.—HYDROCARBON BURNER.—Jas. Haley White, San Francisco, Cal.

I claim, 1. The combined use of the products of decomposed steam and wet or ordinary steam, each being introduced separately, and in such proportions as may be required, into a gasholder or mixer, for the more perfect combustion of the vapor of hydrocarbon oils, substantially as described.

2. The superheating and decomposing apparatus, consisting of the cylinders, J J' and I, and the gas or supply-tube within the mixer or holder, D, substantially as described.

3. The horizontal cylinders or mixers, D D, having openings or burners entirely around their circumference, on the under side as well as the others, which causes them to be more effectually heated, and also prevents their filling or being clogged by a residuum.

4 The combination and arrangement of the interior perforated tubes or pipes, F, *g*, and *d*, with the exterior cylinders or mixers, D D, substantially in the manner and for the purpose set forth.

5. In combination with the above-claimed apparatus, the perforated air-tube, L, for supplying hot air to render the combustion of the vapor and gases issuing from the mixers more perfect.

IRON ORE DISCOVERED IN CHESTER COUNTY.—A rich vein of iron ore has recently been discovered on the farm of James Magraw, in East Nottingham township, Chester county, about two miles south of Oxford. The field has been leased for ten years by a company in Berks county. Mr. Magraw granted them the privilege of opening four pits, and two have already been dug, in the second of which a vein of ore of the best quality has been struck.—*West Chester Record.*

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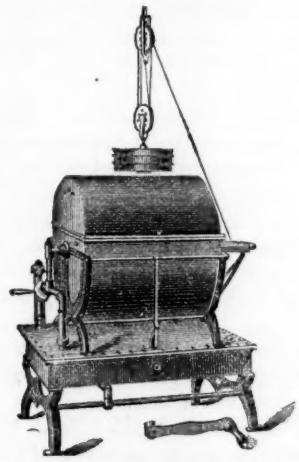

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Testimonials.

SOUTHBORO', March 20, 1867.

MESSRS. O. P. DRAKE & Co., BOSTON:

Gentlemen: In answer to your inquiry, I will say that I had your Gas Machine in use about nine months, manufacturing gas for lighting my store. It gives me but very little trouble. The light is good, clear, and at all times reliable. Its cost is less than half the cost of street gas. As regards safety, I think it very much safer than Kerosene lights.

Yours respectfully,
WM. C. BARNES.

BOSTON, Aug. 22, 1867.

MESSRS. O. P. DRAKE & Co., 8 Bedford-st., Boston:

Gentlemen: I purchased of you, Nov. 18, 1865, one of your Solar Gas Machines, for my house at Auburndale; and from that time until the present, I have enjoyed uninterrupted success with it. The light is uniform, clear and steady, and the best I have ever seen. I have never experienced trouble of any nature from the machine, and consider it invaluable. As to its safety as compared with any other illuminator, I consider it far superior, and have discarded everything else in the shape of oil, fluid, kerosene, etc. Hoping your invention may prove remunerative, I remain,

Yours respectfully
W. E. PLUMMER,
53 Merchants' Exchange.

LAKE FOREST, ILL., Aug. 30, 1867.

CHAS. MATTHEWS, ESQ., Agt of Drake's Solar Gas Mach., Chicago:

Dear Sir: Your letter was received, asking how I liked the working of the Solar Gas Machine put up by you for me. I would say that I have had the machine in constant use for the last 6 months, and am well pleased with it. The light is clear and steady, and the whole apparatus works to my entire satisfaction.

Yours,
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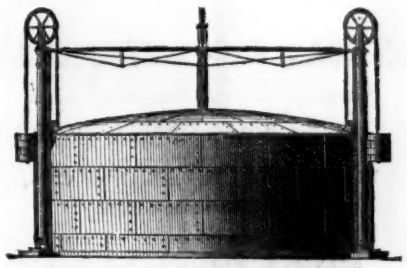

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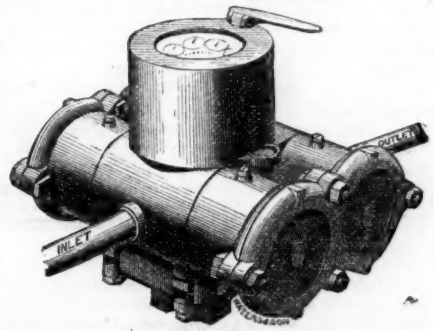

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EDITORS AND PROPRIETORS.

MONDAY, FEBRUARY 3, 1868.

WISHING TO MAKE this Journal an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of those subjects a pleasure, or a profession.

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Answers To Correspondents.

T. P., of Penn.—The exact equivalent of heat is 772 foot-pounds, according to Joule's most recent researches Fahrenheit's thermometer obtains its Zero by a mixture of ice and salt. Fahrenheit thought this gave him the greatest cold possible. The freezing point of water is 32° above this Zero.

S. A. F. of Ohio.—It is said chloride of sodium, or common salt, will greatly improve the light of coal oil lamps, by adding ¼ in weight to the oil. That it makes the light much more brilliant and clear, keeps the wick clean, and prevents smoking.

L. A., of Ill.—The mere substitution of one known material for another is not patentable. A novel way of combining the parts might be the subject of a patent. An inventor's patent cannot be taken from him by an ordinary attachment for debt.

C. A. D., of N. Y.—The scientific doctrine generally accepted now is, that heat is the result of motion, and that light is also due to an undulatory motion; but these are simply expressions to convey an idea of the operations of nature. The great first cause is beyond man's limited knowledge.

D. A., of Mass.—The sal ammoniac of commerce is formed by saturating the ammoniacal water obtained in gas works with hydrochloric acid (muriatic acid), and evaporating it, usually, in vessels of lead, and then run into wooden coolers. The salt is then dried and finally sublimed in iron pots with large domes.

L. O. P., of Pha.—By steeping wood in water containing carbonate of lime and silica in solution, it becomes petrified. Stone naturally friable and porous, may be washed with silicate of soda, and subsequently with lime water, which will indurate it, and greatly prevent the action of the elements.

N. A. T., of Conn.—An instrument to indicate the *purity* of the atmosphere has not been introduced into use, that we are aware of. Such an instrument would be very useful and valuable, if not too complicated or expensive. An instrument has been invented to indicate the presence of fire damp in mines, by means of a tight tube, with one end covered with a piece of loose leather or bladder, which is sensibly depressed when the air in the mine is dangerous, owing to the law of endosmosis and exosmosis in gases, whereby the air in the tube becomes mixed with the fire-damp through the porous diaphragm to produce a partial vacuum. This diaphragm is made to act upon a lever, pointer and graduated dial, to indicate the condition of the air.

THE HACKNEY ROAD AND FULHAM STATIONS OF THE IMPERIAL GAS CO. OF LONDON.

At the former of these stations are 386 retorts, 19 ft. 6 in. long, principally set 10 in a bench, upward of 425 tons having gone through the whole in a day of 24 hours. The coke is fed red-hot from the retorts through moveable shoots into the furnaces. There is no station meter. The great holder is 201 feet in diameter on the lower, and 198 ft. 6 in on the upper lift, and "goes out" 80 feet, thus containing about 2,500,000 cubic feet. There are a number of smaller holders at the same station, two of which are upwards of 100 feet each in diameter. The tank of the great gasholder is 204 feet in internal diameter, and 41 ft. 6 in. deep, the wall being carried up in cement for its whole height. The site was that of a pond, and the clay was 35 feet below the surface. The whole cost of the gasholder, including the tank, was $265,000, of which a large part must have been required for the tank alone.

The retort houses at the Fulham station contain 380 long retorts, 240 of which are set 6 in a bench, while 140 more are set 10 in a bench. It is to be borne in mind that 6 is the number now adopted in setting new retorts. These works present the peculiarity of having neither hydraulic mains nor condensers. The tar is collected in separate boxes, and the gas passes directly to the exhausters, of which there are four of Beale's; from the exhausters it passes to a huge dry scrubber, and thence to four scrubbers well supplied with ammoniacal liquor. The oxide of iron purifiers are believed to be the largest in the world, being 20 ft x 37 ft., the oxide being placed in very shallow layers, and requiring renewal very often; the lids are heavily counterweighted. Dry lime is used on the upper tray of each purifier. The last process of purification is effected by a scrubber charged with sawdust and dilute sulphuric acid.

The four holders have an aggregate storage of 3,322,000, while an additional one 232 ft. x 64 ft. (the largest in the world except Mr. King's new holder at Liverpool) and having a capacity of 2,600,000 cubic feet, is just completed.

Hourly records of illuminating values, by a jet photometer, are taken at this station. During the month of November, 1867, the candle-power was 15¼ and the sulphur 20.49 grs. per 100 cubic feet.

The above details, though rather meagre, are suggestive enough.

We notice, first—the use of "through retorts," which are not approved by the enormous Paris Gas Company (whose make during 1866 was 4,320,000,000 cubic feet) nor by the companies of continental Europe. They have been tried in one or more of the large New York works, and found wanting. The Imperial company make but 4,000 to 4,500 cubic feet per "mouth-piece" against 5,500 to 7,000 cubic feet which is a result common enough with us, even in small works.

The setting of Tens is given in Clegg, and possesses little interest to us, from motives which are stated in the article on the "Practical Management of Gas Works" in another column. The use of red-hot coke in the furnaces shows how close attention is paid to economy of fuel,

The Reverend Mr. Bowditch in a book ("Analysis and Purification of Coal Gas") by him devised, proposes a heated hydraulic main and condensers; and says of those who differ with him:—"No suspicion seems to cross their minds that they are "enabling the tar (*i. e.*, the heavier oils) to dissolve "out from the gas, and carry down with it the "vapors of hydrocarbons which they ought to preserve with the greatest sedulity." Now in this he is hardly fair to the managers of the Imperial Co., who fight shy of any such condensers as the noble "Immersed Multitubular," and use no water except such as is derived from the coal as ammoniacal liquor, until the gas reaches the sulphuric acid scrubber.

We observe the use of the revivifiable oxide of iron. For this, the company cannot be held responsible. English chemists have fully ascertained the fact that the oxide does not attack the bi-sulphide of carbon, while the hydrate of lime does; and the president of the British Association of Gas Managers (London *Journal of Gas Lighting*, vol. XV. p. 490) deprecates strongly the sanitary legislation which compels the use of the oxide. He also states that by continuous washing the sulphur may be reduced to two grains per 100 cubic feet, gas of 18-candle power falling actually to three or four candles in the process.

In regard to the exhausters, they are cumbrous affairs compared to the "Mackenzie Force Blast," which, in one of its modifications, is most highly approved in America. Its work is more equable, and its effective duty represent a higher percentage of power even than the Jones Exhauster, upon the surfaces of whose pair of "dumb-bells," or "figure eights" a troublesome scale of carbonaceous deposite, not unlike vulcanite in consistency, is apt to form.

Mr. Kirkham's plan of a "by pass" to the seal-box which he substitutes for the hydraulic main involves expensive valves, and the labor for manipulating them, both of which are obviated by the proper speeding of the exhauster, and the reduction of the seal, by some such adjusting device as that illustrated upon our first page, to say an inch of water. Mr. Ohrens, of the Crystal Palace Gas Works, employed a similar moveable disk in 1861 (Clegg, 4th edition, p. 184).

The growing length of this sketch forbids the notice of many minor features of the Imperial Co.'s works. We therefore close with the candid expression of our wonder that any engineer is able to calculate his storage temperatures, receipts and deliveries so closely as to handle a dozen holders with any degree of satisfaction to himself without a station meter.

Some English gas-managers are searching anxiously for a suitable lubricator for their exhausters. If these last are properly constructed and placed, as they should be, next to the hydraulic main, the hot vapors of the gas itself will solve their inquiries.

"OUR GAS MONOPOLY."

In an article which bears this familiar title, the New York *Herald* of the 20th ult. makes the welkin to resound with its plaints. It would seem that it deputed an ambitious, but most unmathematical creature, to go cunningly and spy out the weak joints in the harness of our great companies, that so the conscience of the *Herald* (which is a little joke, you know), might explode in ululation and rigorous meting out of justice.

So said so done: and now the Manhattan company shivers through all its "*fifteen* miles of pipe," and the Staten Island company plays Belshazzar upon its "*fifty* miles of ditto," while the other companies do Niobe in various attitudes.

The emfortable youth, (for he must be *very* young) in his prowlings about among books and gas works, met and "courteously doffed his hat" to the "blandly smiling" secretary of the —— Gas Co.; and straightway put him through such a course of catechism as drove him nigh madness. The interloper was excessively shrewd and not to be beguiled by the poor subterfuges with which he was met

for did he not "amiably extend his hand" for the official papers for which he longed, and was not the amiability and the extension in vain?

Howbeit, he gathered some store of portentous facts, and did hie him "with partial statements singing in his ears" to a dim, sequestered den, to collate, and arrange, and apply them. He is a calculating machine, is this feeble youth (but in no sort related to Babbage), and for utter extermination of decimal fractions, and for majestic abuse of subtrahends, rises peerless above any dwarf like Euclid or Legendre. The world has never seen such an incarnate arithmetician as this youth, and we sadly fear that we, our children, and our grand-children, will never, NEVER see his like any more.

He tells us that gas coal costs $4 per ton, while the strong impression of our companies is that it costs them nearer $10 than $9. He informs us that if we subtract four-tenths of a mill from twenty-five cents the remainder is *twenty-four cents and six mills.*

He says that the companies make gas at a cost of "one and three-tenths cents per cubic foot," *or thirteen dollars per thousand*, and then magnanimously sell it "to the public at twenty-five cents per hundred," or *two dollars and fifty cents per thousand.* By this plan the Manhattan Gas Co. ingeniously contrive to elicit a profit of $1,300,000 per annum from the pockets of its consumers.

It would be waste of powder to reply seriously to an article which might be mischievous in its effects, were not its malice made innocuous by its unequalled stupidity and utter disregard of well known facts. It is a vast tissue of fustian, and hardly calculated to elevate the reputation of its occult author as a chemist, an engineer, or even a reporter.

FEW persons can make a better *paying* investment, of a dollar and a half, than to send it for a whole year's subscription to the *American Agriculturist* which is now entering upon its 27th annual volume. Though very good in the past, the quality of the first number for 1868 shows that this superb journal has still better things in store for this year's volume. The paper has been kept up to its full standard of excellence by the associate editors, and we learn from the number before us that Mr. Orange Judd, the long time editor in chief, has just returned from his lengthy tour in Europe, rested and reinvigorated, and that he will resume his labors upon *Agriculturist*, with no diminution in the recent strong editorial force that have so ably conducted the paper in his absence. This journal has already a circulation averaging half a dozen subscribers for every Post Office in the United States and British America, but we presume that in its new, spacious, and permanent headquarters at 245 Broadway there will be room to supply all new comers. The large size of the *Agriculturist*, its great number of beautiful and instructive engravings, its vast store of useful, practical, and reliable information about all matters pertaining to the Farm, the Garden and the Household; its pleasing and instructive department for children and youth, with its unsparing exposures of the humbugs and swindlers that abound, all render this journal a very valuable, and almost indispensable aid to every man, woman and child, in city, village, and country. The terms, owing to its immense circulation, are put down to the very low price of $1 50 a year, or four copies for $5. Take our advice and send for it a year, or, at least, send 15 cents, and get a post-paid specimen copy. Orange Judd & Co., 245 Broadway, New York, are the Publishers.

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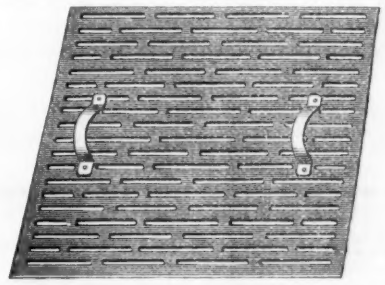

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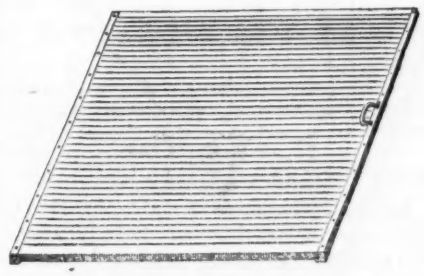

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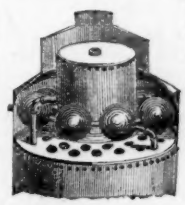

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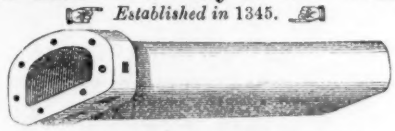

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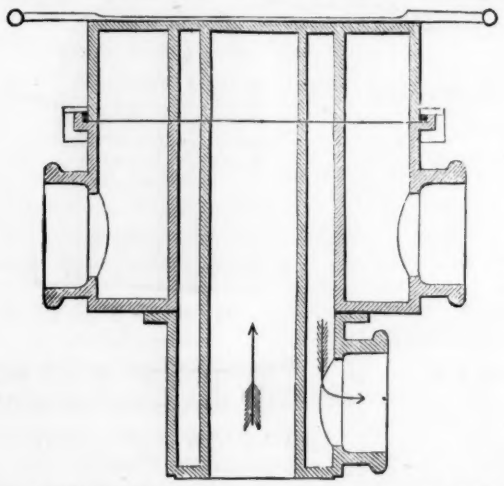

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The Mackenzie Patent Gas Exhauster,

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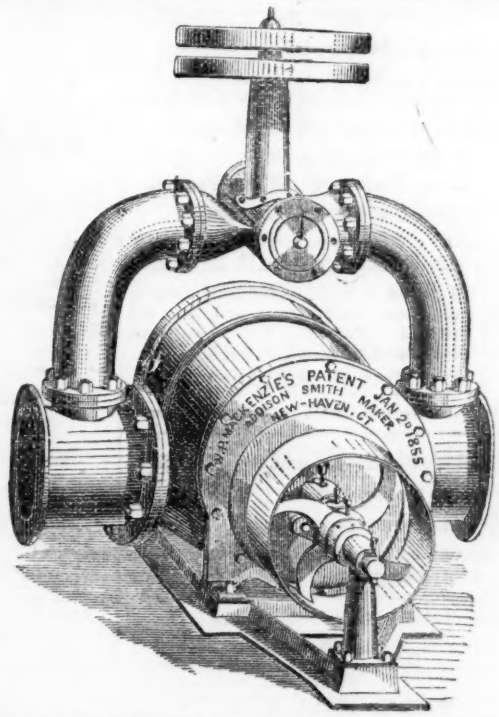

They are made to pass from 4,000 to 150,000 cubic feet of gas per hour; will increase the production and illuminating power of the gas, and add very much to the durability of the retorts, either clay or iron. The Compensator obviates entirely the necessity of water-joints, is compact, durable cleanly, not liable to get out of order, self-acting, quiet, and certain in its operation.

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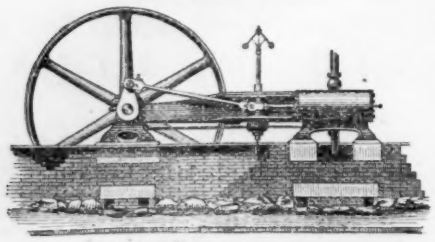

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Flue and Tubular Steam Boilers, Tanks, Oil Stills, Mill Work, Machinery, etc., etc.

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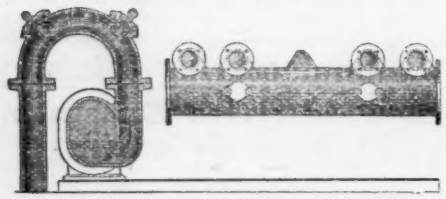

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Steam Engines, Mill Gearing, Hydraulic Presses for the manufacture of Linseed and Cotton Seed Oils, Sugar Mills, Single and Double Action Pumps, also Steam Pumps, Coal Oil Machinery, High and Low Pressure Boilers, Tanks, Kettles, Soap Curbs, &c., MADE AND REPAIRED AT THE SHORTEST NOTICE.

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PATENT LEAD-INCASED TIN PIPE COSTS LESS THAN LEAD PIPE AND IS MUCH STRONGER.

INDORSED BY PHYSICIANS AND WATER COMMISSIONERS EVERYWHERE.

Recent improvements enable us to supply this pipe at a less price per foot than common lead pipe. To furnish the cost we should know the head or pressure of water and bore of pipe.

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Three sections of hydraulic main 15 inches diameter, suitable for three benches of three retorts each, with stand &c., and Dip Pipes of 8 inch diameter.

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The above are in good condition and can be seen at the Works Will be sold low if applied for soon. G. RICHARDSON, Pres. (84-4t

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Odorless Gas Heating and Cooking STOVES AND RANGES.

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The only inodorous Gas Heaters made in the world.

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Manufacturer of all kinds of GAS and WATER PIPE, BRANCHES, CONNECTIONS, T's, ELBOWS, and ALL CASTINGS USED AT GAS AND WATER WORKS.

I offer special inducements to parties wishing to purchase, my Pipe is Smooth, regular in weights, and cast vertically.

N. B.—Pipe from 3-inch and upwards cast in 12-ft. lengths.

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Manufacturers of the

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This BAG-HOLDER is emphatically the FARMERS and GRAIN DEALERS FRIEND. Does the work of two boys in holding a bag open, and with it a farmer can bag up grain, potatoes apples, etc., as fast as two men in the ordinary way. It has large sales at the West, where first introduced. Retail price $5. Sent to any address.

THE SHINGLE BRACKET

Is especially adapted for Builders, house Joiners, Masons, and Carpenters. With it a scaffolding can be built in less time upon a roof and with greater safety, and taken down as quickly, without leaving a single nail hole in the roof. Retail price $6 per dozen. Send for illustrated circulars as above. Orders promptly filled, at wholesale and retail.

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which cooks all vegetables and meats together, without flavoring each other, and does away with all offensive odors. SAVES LABOR, FUEL AND TIME.

SEEING IS BELIEVING.

One trial will convince any one. Large numbers now in use and everybody pleased; sold low; several sizes—fit any stove—a whole dinner can be cooked on one stove-hole. Orders promptly filled, at wholesale and retail. Send for an illustrated circular, with full particulars. Retail price: 7 in. $4; 8 in. $5; 9 in. $7; 10 in. $10. Sent to any address on receipt of price.

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Metal Top Lamp Chimney,

First Quality Extra Annealed Glass.

Will not crack or break from sudden changes of temperature, is readily cleaned, and with ordinary care should last just as long as he lamp on which it is used. Liberal discount allowed to the rade. Samples seat on receipt of fifty cents.

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The process of reconstructing Slate Stone from a disintegrated state was

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It is a combination of

Pulverized late & Viscous Matter,

(the latter possessiug qualities of geological and chemical affinity for the former,) and is a development of one of the simple but unalterable tendencies of nature.

As a Roofing Material it Stands Unrivalled.

A mastic—it adapts itself to every shape and slope. Non-combustible, impervious, non-expansive, and undecaying.

Frost does not Crack nor Heat Dissolve it.

The only roofing material ever discovered that will resist the action of the elements as long as the structure it protects. Being susceptible of little, if any wear, from exposure, and

Perfectly Fire-Proof,

It is unequalled as a coating for Railroad and Farm Buildings Fences, Bridges, bottoms of Vessels, Vaults, etc.

GAYLORD'S PATENT COUPLINGS,

Fig 3

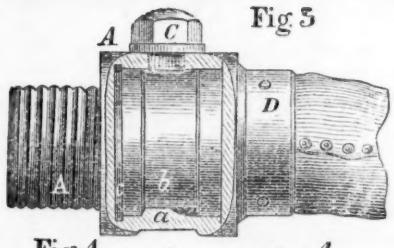


Fig 4

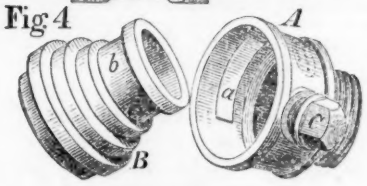
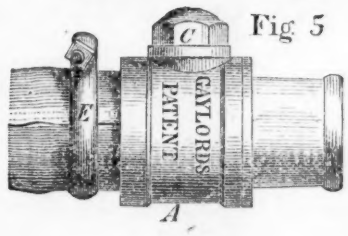


Fig 5



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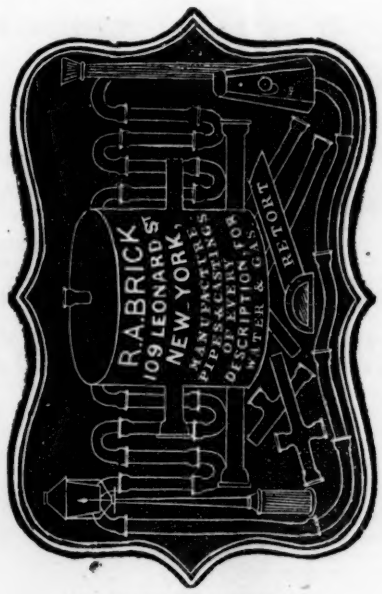

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For Steam, Water, or Gas.

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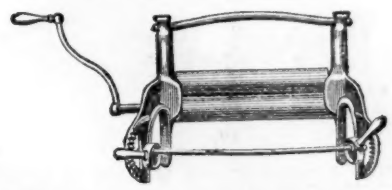
IT IS THE ONLY RELIABLE

Self-Adjusting Wringer.



No Wood-work to Swell or Split. No Thumbscrews to get out of order. Warranted with or without Cog wheels.

It took the First Premium at Fifty-seven State and County Fairs in 1863, and nearly double that number in 1864, and is, without an exception, the *best* Wringer ever made. Patented in the United States, England, Canada, and Australia. Agents wanted in every town, and in all parts of the world. Energetic agents can make from $3 to $10 per day

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That Iron well galvanized *will not rust.*
That a *simple* machine is better than a complicated one.
That a Wringer should be *self-adjusting, durable, and efficient.*
That thumb-screws and fastenings cause *delay* and *trouble* to regulate and keep in order.
That wood soaked in water will *swell, shrink,* and *split.*
That wood-bearings for the shaft to run in *will wear out.*
That the Putnam Wringer, with or without cog wheels, will *not tear the clothes.*
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That the Putnam Wringer has *all* the advantages, and *not one* of the disadvantages above named.
That all who have tried it pronounce it the *best* Wringer ever made.
That it will wring a thread or a bed-quilt *without alteration.*

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PUTNAM MANUFACTURING CO.—*Gentlemen:* I know from practical experience that iron well galvanized with zinc will not oxydize or rust one particle. The Putnam Wringer is as near perfect as possible, and I can cheerfully recommend it to be the best in use. Respectfully yours,

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Sample Wringers sent, express paid, on receipt of price.
Manufactured and sold, wholesale and retail, by
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CLEVELAND O.

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HIGHEST PREMIUM

Shuttle Sewing Machine.

Has only to be seen and operated to be appreciated.

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SUPERIORITY

over any other machine in the market will be seen at a glance:
1st. It runs easily and rapidly, and is so constructed as to endure all kinds of hard usage.
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6th. The variety of fancy work that can be done on the

WEED MACHINE,

with so little trouble, make it equal, if not superior, to six machines combined; for instance, it binds, tucks and sews on the band at the same time, and in fact, the

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as before stated, is equivalent to a combination of any six ordinary machines.

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No. 2. Oil Black Walnut, Ornamented with Hemmer.	$60,00
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Continue as heretofore at the OLD ESTABLISHMENT, Nos. 1115 and 1117 Cherry Street, Philadelphia,

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From our long Practical Experience of the Business (covering a period of 20 years) and from our personal supervision of all Work, we can guarantee all orders to be executed promptly, and in every respect satisfactorily.

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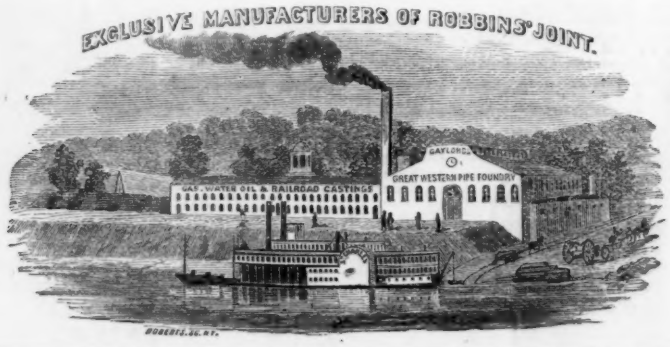

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THE "GROVESTEEN PIANO-FORTE"
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By the introduction o improvement we make a still more perfect Piano-Forte, and by manufacturing largely, with a strictly cash system, are enabled to offer these instruments at a price which will preclude all competition.

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Late Asst. Engineer of the Philadelphia Gas-works
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For Country Residences, Public Buildings, &c.,

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Gas Fitting in all its bauches

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SAFETY STEAM PUMP,

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Photometers, Pressure Registers, Indicators, and Gauges, Governors, Meter Provers, Centre Seals, Fluid Gauges, &c.

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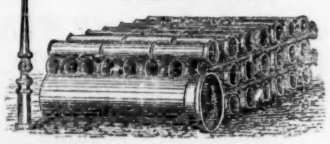

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IN EVERY TOWN.

To accomplish this at once and save the expense of a *Travelling Agent*, we offer thus, viz:

Any one sending us orders for two machines shall receive one machine free of charge. This proposition cannot avail after we have appointed a local agent in the town.

We have now completed our *new manufacture* at a cost of some $200,000—introducing *new patents*, and such important improvements, that without fear we are able to offer the following stringent guarantee, viz: After a fair trial, if any purchaser does not prefer the FINKLE & LYON FAMILY SEWING MACHINE to any other, he can return it and have back his money.

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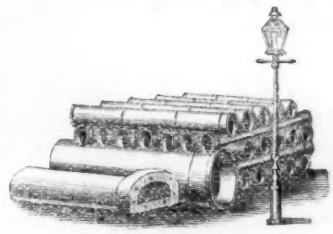

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Have been placed on the route to Savannah by the Atlantic Mail Steamship Company of New York, and are intended to be run by them in a manner to meet the first class requirements of the trade. The cabin accommodations of these ships are not excelled by any Steamers on the coast, and although their carrying capacity is large, their draught of water enables them to insure a passage without detention in the river

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San Jacinto, .. " 20
San Salvador, .. " 27
San Jacinto Saturday, Nov. 3
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San Jacinto .. " 17
San Salvador, .. " 24

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PASSAGE AND FREIGHT AT REDUCED RATES.

Sailing days from New York.
1867.

February 20th, March 10th and 30th.
" April 20th, May 10th and 30th.

And so on at intervals of twenty days, leaving on the Saturday previous, when a regular sailing day comes on Sunday.

For further information, apply at the Company's office, 177 West-st., corner Warren-st., New York.

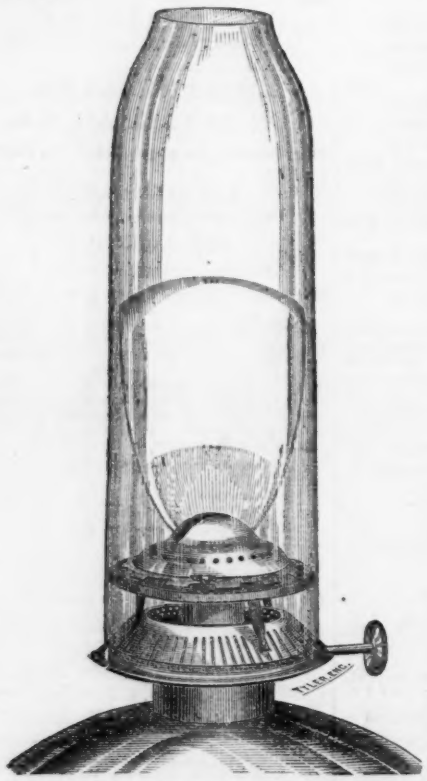
66tf D. N. CARRINGTON, Agt.

THE PARIS EXHIBITION BUILDING.—The *Nord* says the Exhibition building will not be pulled down, now that the Exhibition is over, but will be used for an international bazaar, in which the productions of all parts of the world will be offered for sale. A canal is to be made between the Seine and the Champ de Mars, so as to place the building in direct communication with the river.

The Solar Burner.

Next to gas-light there is no light for the millions equal to that produced by kerosene, when a proper burner is employed. Among the numerous improvements in coal oil burners which have been introduced to the public since petroleum has taken the place of whale oil, "tallow dips," and their congeners, the "Solar-Burner" seems to have taken a long stride in the march of improvement.

The accompanying engraving clearly illustrates this improvement. The lamp, or oil receptacle is of the usual form, the burner and chimney being the novel feature in the invention. The chimney is broad at the bottom, and slips over the disk or cone, and rests upon a corrugated base, a portion of which is convex and perforated to admit air freely to the flame. The disk or cone has a cushion around its outer edge, which interposes between it and the chimney. This is a non-conductor of heat, and prevents the chimney breaking. Metal disks are always liable to this evil, owing to the excessive heat they impart to the glass. It is said more chimneys are broken from this cause than from all others.



The disk is so made that it can be thrown back or removed entirely, thus exposing the wick for trimming. The chimney never heats at the base, and can be removed with the hand. Hence, also, the lamp does not become heated to generate dangerous gases, and danger of explosion is entirely obviated. The transparent base gives free passage to light which is hidden and lost in the common burner.

This lamp is easily managed, is cheap, and is said to give a better light at two-thirds the cost of ordinary burners.

The trade speak very highly of this burner, which proves it to be a success. We understand the manufacturers are hardly able to keep up with orders, the demand is so great.

The Scoville Manufacturing Company, Waterbury Conn. (office, 4 Beekman street, N. Y.) manufacture and sell these burners.

Miscellaneous Items.

—Alloys of steel with platinum are said to be very perfect in every proportion that has been tried. The proportion for edge instruments is about one-fifth per cent. of the metal. Equal parts by weight form a beautiful alloy which takes a fine polish and does not tarnish; the color is the finest imaginable for a mirror

—The first employment of electricity for firing gunpowder dates as far back as 1751, and is due to Franklin; and in 1767 Priestly turned his attention successfully in the same direction.

—Boston is suffering from a lack of dwelling-houses, and a Boston paper says that so great is the demand that when a wheelbarraw of bricks passes along the streets the progress of the vehicle is checked until a curious crowd has elicited from the propeller thereof where the house is to be built, and its probable rent.

—There are upward of one thousand stationary steam engines employed within the corporate limits of the city of Philadelphia, aggregating from 25,000 to 30,000 horse power. About one-half of the number obtain their water supply from the city water works.

—Artificial oil of bitter almonds is manufactured from the benzole of coal tar. A fine stream of benzole and another of fuming nitric acid are allowed to run together in a worm kept well cooled. The liquids react on each other on coming in contact, heat is disengaged, and the artificial oil collected at the end of the worm is first washed with water, then with a solution of carbonate of soda, and lastly again with water.

—The Ticonic Water-power Company, of Waterville, Maine, have secured possession of all the available water-power from Tiocnic Bay to Kindalls Mills, which will enable them to erect two dams with a head of 20 feet each, being an aggregate of 8,889 horse-power, and sufficient for working 592,000 spindles. Engineers are engaged in preparing plans and estimates for dams.

—Experiments have been instituted by a German chemist to ascertain the best method of preparing bronze powder. It appears that the several varieties of bronze powder are each composed of nearly the same proportions of copper, zinc and tin, and that the variation of color is owing to different degrees of oxidation, which have been produced by heating the alloy at different temperatures. The subdivision of the alloy is effected by rolling and hammering, as in the preparation of gold leaf, and then grinding the leaves of metal with water between stones.

—A singular accident occurred a few days ago at one of the iron foundries in Chester County, Pa. The workmen, after having filled the furnace previous to casting, threw a quantity of iron scraps covered with snow and ice upon the stock, which prevented the escape of the gas generated at the bottom of the furnace, causing it to flow back into the chambers leading to the fan. An explosion was the immediate result. The cast-iron fan was shivered, the staples and hinges torn from the door, the windows of the engine-room were blown out, the engineer going through one of them, but without receiving any injury. Nobody was hurt; but the damage done to the foundry was considerable.

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